## Remarks

Applicants respectfully request reconsideration of the above application in view of the present amendments and the following remarks. Claims 1-39 are pending in this application. Claims 30-35 have been amended and claims 36-39 have been added to clarify the subject matter which Applicants regards as the invention and to place the claims in better condition for allowance. The recited tapering uniform castable refractory body in claims 36-39 finds support in the specification. (Page 3, Lines 23-25, Page 4, Lines 6-9, and Page 9, Lines 12-15.) No new matter has been introduced by virtue of the present amendments.

The Examiner objects to claims 30-36 under 37 C.F.R. § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicants believe that the Examiner is referring to claims 30-35 since claim 36 does not exist and the Examiner refers to rejecting claims 30-35 in the Office Action Summary. According to the Examiner, claims 30-35 do not fairly further limit independent apparatus claims 1 and 13 because the limitations contained in these claims recite only limitations directed to the manner or method of use of the claimed vortex inhibitor, i.e. the use of the inhibitor in molten metal containers containing molten metal which would cause the sacrificial member to dissolve at recited points during the discharge of molten metal.

Apparatus claims cover what a device is. *Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1468. With respect to apparatus claims 30-35, the device is a vortex inhibitor having an elongated sacrificial member. The term sacrificial in claims 30-35 is understood by one of ordinary skill in the art in light of the specification as a structural term. The Applicants' specification states that "[t]he sacrificial nature of the elongated member does not impinge on the flow of molten metal through the discharge nozzle 14." (Page 9, Lines 25-26.) The sacrificial structure of the claimed elongated member can be achieved by one of ordinary skill in the art based on molten metal pouring conditions, as explained in greater detail below.

Moreover, the term "constructed to dissolve" in dependant claims 30-35, as well as independent claims 1 and 13, serves to precisely define the degree of structural frailty, i.e. lack of structural integrity, of the elongated sacrificial member in terms necessary for one of ordinary skill in the art to understand. Claims 1 and 13 recite an elongated sacrificial member that is constructed to dissolve before substantially obstructing the discharge nozzle. Based on this limitation, one of ordinary skill in the art is able to identify elongated sacrificial member structures based on the molten metal pouring conditions, for example, pour time and environmental conditions in the molten metal receptacle.

For example, "the sacrificial member may be constructed of hollow or solid metal and can be coated with a refractory material." (Page 5, Lines 11-12.) The thickness of the refractory can be adjusted depending on the operating conditions of the molten metal receptacle, as long as the sacrificial elongated member is constructed to dissolve as to not impinge on the flow of molten metal through the discharge nozzle. (Page 9, Lines 25-26.)

This adjustment can be accomplished by one of ordinary skill in the art through ordinary experimentation. For example, an individual of ordinary skill in the art can test whether an elongated member coated with a certain thickness of refractory material meets the structural limitation in claims 1 and 13 by dropping the vortex inhibitor into a metal pouring receptacle and measuring the flow rate of molten metal exiting the discharge nozzle. If the flow rate of molten metal substantially decreases while a substantial amount of molten metal remains in the pouring receptacle, the elongated member may not be dissolved, thus causing substantial obstruction of the discharge nozzle. Based on these experimental results, one of ordinary skill in the art can decrease the structural integrity of the elongated member by decreasing the thickness of refractory material so that the elongated member is sacrificed by dissolving prior to substantially obstructing flow of molten metal through the discharge nozzle.

Claims 30-35 limit the structure of the claimed vortex inhibitor in terms of when the elongated sacrificial member dissolves to avoid substantial obstruction of the discharge nozzle. Claims 30 and 33 recite that the elongated sacrificial member is constructed to dissolve before discharge of molten metal is terminated. Claims 31 and 34 recite that the elongated

sacrificial member is constructed to dissolve before discharge nozzle is closed. Claims 32 and 35 recite that the elongated sacrificial member is constructed to dissolve before entering the discharge nozzle. One of ordinary skill in the art can ascertain the elongated sacrificial member structures associated with these claim limitations based on molten metal pouring conditions and ordinary experimentation.

For at least the reasons stated above, claims 30-35 are not of improper dependent form for failing to further limit the subject matter of a previous claim. Therefore, Applicants respectfully request that the Examiner withdraw the objection of claims 30-35 based on 37 CFR 1.75(c).

The Examiner argues that claims 1-25 and 30-35 are indefinite because independent claims 1 and 13 recite that the sacrificial member be constructed to substantially dissolve before they obstruct the discharge nozzle. According to the Examiner, without any indication as to what the molten metal is, and the depth of metal in a vessel from which the molten metal is to be poured, as well as the discharge rate out of the molten metal nozzle, it is impossible to ascertain which constructions would meet the limitation of dissolving before obstructing the discharge nozzle, thereby making the scope of the claims unascertainable.

The "constructed to dissolve" limitation of claims 1 and 13 provides a complete, definite, and accurate description of the structure of the claimed elongated sacrificial member based on the understanding of one of ordinary skill in the art. *In re Warmerdam*, 33 F.3d 1354, 1361 (Fed. Cir. 1994) ("The legal standard for definiteness is whether a claim reasonably apprises those of ordinary skill in the art of its scope."); *Shatterproof Glass Corp. v. Libbey-Owens Food Co.*, 758 F.2d 613, 624 ("if the claims, read in light of the specification, reasonably appraise those skilled in the art both of the utilization and scope of the invention, and if the language is as precise as the subject matter permits, the courts demand no more[.]")

This limitation sets forth a degree of structural weakness for the elongated sacrificial member based on when the elongated sacrificial member dissolves. Namely, the elongated sacrificial member dissolves "before substantially obstructing the discharge nozzle."

The structural attributes of such an elongated sacrificial member can be ascertained by one of ordinary skill in the art based on the operating conditions of the metal pouring receptacle and ordinary experimentation. For example, the elongated sacrificial member can be a solid metal rod covered in refractory material of a certain thickness. Upon dropping the elongated sacrificial member into the metal pouring receptacle, one of ordinary skill in the art can measure the flow rate of molten metal through the discharge nozzle over time. If the flow rate of molten metal substantially decreases while a substantial amount of molten metal remains in the pouring receptacle, the structural integrity of the elongated sacrificial member is such that it lasted long enough to substantially obstruct the discharge nozzle, thereby decreasing the flow rate. One of ordinary skill in the art would recognize that by decreasing the thickness of the refractory material, the structural integrity can be decreased so that the elongated member dissolves prior to substantially obstructing the discharge nozzle.

For at least the reasons stated above, claims 1 and 13 are not indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regards as the invention. Since the Examiner's basis for indefiniteness of claims 1 and 13 has been successfully traversed, claims 2-12 and 30-32, depending either directly or indirectly from claim 1 and claims 14-25 and 33-35, depending either directly or indirectly from claim 13, are also definite. Therefore, Applicants respectfully request that the Examiner withdraw the rejection of claims 1-25 and 30-35 based on 35 U.S.C. § 112, ¶ 2.

The Examiner rejected claims 1, 4, 9, 13, 14, 23-25, and 30-35 under 35 U.S.C. § 102(b) as being anticipated by *Eastwood* (U.S. Patent No. 5,451,036). The Examiner argues that *Eastwood* teaches a vortex inhibitor comprising a uniform refractory body (2) having a generally tapering shape along a longitudinal axis from a base to a narrow end, and including a hollow chamber (3) which may include a shaft (15) and a "sacrificial member" (10) connected to the uniform refractory body, where the vortex inhibitor is inherently self orienting when supported in the molten metal, thereby showing all aspects of the above claims.

The above claims are not anticipated by *Eastwood*. *Eastwood* does not teach, disclose, or suggest, either explicitly or inherently, an elongated sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle, as recited in independent claims 1 and 13.

*Eastwood*'s explicit teachings are directed at improving the strength of conventional metallurgical darts consisting of a head and tail to decrease breakage during handling. ("[t]he basic object of the invention is to provide an improved dart, and an improved method of dart assembly, compared with prior art proposals", Column 1, lines 49-51.) According to *Eastwood*, prior art proposals "consist basically of ... an attached tail ... with at least a portion of the tail extending below the head and being adapted to engage in the tap hole of the furnace[.]" (Column 1, lines 13-15.) To improve upon prior art proposals, *Eastwood* teaches "an elongated tail of refractory material ... such that the tail can pass, as a close fit, through the lining sleeve of the head" (Column 1, lines 59-64) and preferably encasing the tail "in a metallic sleeve or jacket [to provide] considerably more strength than prior art proposals, as the metallic sleeve or jacket protects the refractory during handling." (Column 2, lines 24-28.) Moreover, the primary constituent of *Eastwood's* tail is refractory material — which is meant to endure in a molten metal environment. For at least these reasons, *Eastwood* does not explicitly disclose or teach an elongated sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle.

The Examiner argues that the member (10) of *Eastwood* would eventually dissolve in some unspecified molten metal at some unspecified temperature before reaching a discharge nozzle in some unspecified amount of time and the above claims as explained previously, allow for any molten metal at any temperature where the vortex inhibitor is immersed in the molten metal for any time before reaching the discharge nozzle. The Examiner urges that the sacrificial nature recited in Applicants' claims is inherently taught by *Eastwood*. However, *Eastwood* does not inherently teach, disclose, or suggest an elongated sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle. "[A]n inherent property must necessarily be present in the invention described by . . . the [claim], and it must be so recognized by persons of ordinary skill in the art. *See Continental*

*Can Co. v. Monsanto Co.*, 948 F,2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991); *Riney*, 77 F.2d at 528, 25 USPQ at 421 (noting that the inherent property 'would be at once apparent to any one skilled in the art')." *Hitzeman v. Rutter*, 243 F.3d 1345, 1355 (Fed. Cir. 2001). The sacrificial property of the claimed elongated member is not necessarily present in the teachings of *Eastwood* and is not at once apparent to any one skilled in the art. To the contrary, the improved tail taught by *Eastwood* persists in the molten metal environment, thus engaging and residing in the discharge nozzle and substantially obstructing the discharge nozzle. Assuming arguendo that the tail taught by *Eastwood* could dissolve before substantially obstructing the discharge nozzle under certain circumstances, this is a result explicitly taught away from by *Eastwood*. *Eastwood* admits that the tail member of his invention is durable enough to withstand the entire pouring process.

Moreover, the alleged eventuality that *Eastwood's* tail will dissolve before entering the discharge nozzle under certain conditions does not mean that the sacrificial nature recited in Applicants' claims is inherently taught by *Eastwood*. Occasional results are not inherent. *Mehl/Biophile International Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999). ("As this court's predecessor stated in *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981) (quoting *Hansgirg v. Kemmer*, 26 C.C.P.A. 937, 102 F.2d 212, 214, 40 USPQ 665, 667 (1939)) (internal citations omitted): Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.") For at least these reasons, claims 1 and 13 are not anticipated by the *Eastwood* reference.

The Examiner rejected claims 1-25 and 30-35 under 35 U.S.C. § 103(a) as being obvious from the teaching of *Eastwood*. With the ordinary skill in the art, *Eastwood* does not teach, suggest, or motivate the claimed invention. *Eastwood* teaches a structure for improving the longevity and ease of constructing tailed, throttling elements. The ordinary skill in the art recognizes deterioration of a tail in and out of molten metal and teaches how to avoid deterioration by providing a reinforced tail. Moreover, prior art tails because they endure during the pouring process provide a signal that slag intermixture is imminent and flow should be terminated. In substantial departure from the prior art, the Applicants' claims teach how

to sacrifice structural integrity to avoid substantial throttling of the flow through the discharge nozzle. The Applicants' claims recite a vortex inhibitor with an elongated sacrificial member that dissolves before substantially obstructing the discharge nozzle, that time period is based on pour time and environmental conditions in the pouring nozzle that are not addressed in the prior art relied upon by the Examiner.

The statement that the claimed invention is obvious from the teachings of the prior art is supported only by hindsight guided by the Applicants' present disclosure, and does not provide a proper ground for rejection under 35 U.S.C. § 103. Whereas *Eastwood* teaches a structure for improving the longevity and ease of constructing tailed, throttling elements, the present invention reduces structural longevity and avoids substantial obstruction of the discharge nozzle. As such, the claims of the present invention are not obvious in view of the teachings of *Eastwood* and the knowledge of one of ordinary skill in the art at the time *Eastwood* was made. Applicants respectfully request reconsideration of this rejection in light of the present amendment and remarks.

In summary, Applicants respectfully assert that the pending claims are patentable in view of the *Eastwood* reference. Claim 1, reciting a sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle is patentable in view of the *Eastwood* reference. Claims 2-12 and claims 30-32 depend either directly or indirectly from claim 1 and are, therefore, allowable for at least the same reasons as claim 1 as well as for their own limitations. For instance, claim 4 is directed at an embodiment wherein molten metal is disposed within the hollow chamber upon introduction into the molten receptacle. Claim 9 is directed at an embodiment where crimps extending outwardly from the sacrificial member mount in the hollow chamber to form an integral body and the sacrificial member is filled with a refractory material. These limitations, in combination with the limitations of claim 1, are not found in the prior art. Claim 13, reciting a sacrificial member constructed to dissolve before substantially obstructing the discharge nozzle is patentable in view of the *Eastwood* reference. Claims 14-25 and new claims 33-35 depend either directly or indirectly from claim 13 and are, therefore, allowable for at least the same reasons as claim 13 as well as for their own limitations. For instance, claim 14 is directed at a hollow shaft.

Claims 23, 24, and 25 are directed at a hollow sacrificial member, a sacrificial member that is positioned snugly over the shaft, and a shaft that extends partially within the body, respectively. Claims 33-35 are directed at defining the time period in which the sacrificial member dissolves to avoid substantial obstruction of the discharge nozzle. Claim 33 is directed at an elongated sacrificial member that dissolves before discharge of molten metal is terminated. Claim 34 is directed at an elongated sacrificial member that dissolves before the discharge nozzle is closed. Claim 35 is directed at an elongated sacrificial member that dissolves before entering the discharge nozzle. These limitations, in combination with the limitations of claim 13, are not found in the prior art.

New independent claim 36, reciting a method for improving metal pouring yield by introducing a tapering uniform castable refractory body with a sacrificial member that is constructed to dissolved before substantially obstructing the discharge nozzle and maintaining the uniform refractory body in the metal pouring vessel during at least a portion of the metal pour is patentable in light of the *Eastwood* reference. New claims 37-39 depend directly from claim 36 and are therefore allowable for at least the same reasons as claim 36 as well as their own limitations. Support for new claims 36-39 can be found in the specification: ". . . the vortex inhibitor of the present invention comprises a tapering, castable refractory body [.]" (Page 4, Lines 6-7.)

## CONCLUSION

For the foregoing reasons, Applicant believes that the Office Action of November 1, 2002 has been fully responded to. In view of the foregoing, Applicants respectfully submit that the present application is now in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

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Attachment

# VERSION WITH MARKINGS TO SHOW CHANGES MADE

30. (Once Amended) The vortex inhibitor of claim 1 wherein the elongated sacrificial member [dissolves] is constructed to dissolve before discharge of molten metal is terminated.

31. (Once Amended) The vortex inhibitor of claim 1 wherein the elongated sacrificial member [dissolves] is constructed to dissolve before the discharge nozzle is closed.

32. (Once Amended) The vortex inhibitor of claim 1 wherein the elongated sacrificial member [dissolves] is constructed to dissolve before entering the discharge nozzle.

33. (Once Amended) The vortex inhibitor of claim 13 wherein the elongated sacrificial member [dissolves] is constructed to dissolve before discharge of molten metal is terminated.

34. (Once Amended) The vortex inhibitor of claim 13 wherein the elongated sacrificial member [dissolves] is constructed to dissolve before the discharge nozzle is closed.

35. (Once Amended) The vortex inhibitor of claim 13 wherein the elongated sacrificial member [dissolves] is constructed to dissolve before entering the discharge nozzle.

36. (New) A method for improving yield of molten metal poured from a discharge nozzle of a metal pouring vessel, the method comprising:

introducing a tapering uniform castable refractory body having a hollow chamber positioned longitudinally to the body extending within the body and an elongated sacrificial member retained by the hollow chamber to form an integral body, whereby the integral body combining the refractory body and the sacrificial member has a specific gravity less than the specific gravity of molten metal, and is self-orienting in an elongated sacrificial member downward position when supported in molten metal; and

maintaining the uniform castable refractory body in the metal pouring vessel during at least a portion of the metal pour, while dissolving the elongated sacrificial member before substantially obstructing the discharged nozzle.

37. (New) The method of claim 36 wherein said dissolving step occurs before discharge of molten metal is terminated.

38. (New) The method of claim 36 wherein said dissolving step occurs before the discharge nozzle is closed.

39. (New) The method of claim 36 wherein said dissolving step occurs before entering the discharge nozzle.